



September 20, 2006

**Transmitted Via Email**

Paul Richins  
California Energy Commission  
1516 Ninth Street  
Sacramento, CA 95814-5512

**Re: AES Huntington Beach Retool Project For Units 3 & 4  
Docket No. 00-AFC-13**

Dear Mr. Richins:

Consistent with the direction provided by the California Energy Commission (CEC) during the business meeting on September 14<sup>th</sup>, 2006, AES Huntington Beach (AESHB) submits the attached options for calculating mitigation amounts for consideration by CEC Staff. These options are all based on the science and area of production foregone (APF) methodology recommended by CEC Staff.

As AESHB presented during the business meeting, both the unique nature of this license and the actual or maximum expected operating profile of the units are important factors in determining the proportionate mitigation. The attached proposals are all based on the same underlying assumptions as the CEC Staff proposal. The differences in these proposals reflect various reasonable assumptions regarding plant operations, the term of the certification, and the method to ensure compliance.

AESHB remains committed to compensating for appropriate and proportional entrainment and impingement impacts and we are hopeful that the CEC will find an acceptable alternative among the options we have provided.

Thank you for your consideration.

Respectfully,

A handwritten signature in black ink, appearing to read 'Eric Pendergraft', is written over a horizontal line.

Eric Pendergraft  
Plant Manager, AES Huntington Beach

cc: Donna Stone, California Energy Commission  
Roger Johnson, California Energy Commission  
Arlene Ichien, California Energy Commission  
Paul Kramer, California Energy Commission  
Rick York, California Energy Commission

## HBGS Mitigation Proposal - Option 1a

**Operational Assumptions:** An average of the actual volume of circulating water (CW) flow over the first 5 years of the certification and a reasonable estimate of the shaped annual average volume of CW flow over the remaining term of the license.

### Profile of Actual Average Circulating Water Volume for the First 5 Years:

	1 <sup>st</sup> Qtr	2 <sup>nd</sup> Qtr	3 <sup>rd</sup> Qtr	4 <sup>th</sup> Qtr	Annual	APF (Acres)
% Operation	10%	24%	56%	20%	27.5%	
CW Volume (MGD)	25.4	60.8	142.0	50.7	69.7	41.8

### Profile of Proposed Average Circulating Water Volume for Remaining Term:

	1 <sup>st</sup> Qtr	2 <sup>nd</sup> Qtr	3 <sup>rd</sup> Qtr	4 <sup>th</sup> Qtr	Annual	APF (Acres)
% Operation	15%	35%	80%	25%	38.8%	
CW Volume (MGD)	38.0	88.7	202.8	63.4	98.2	59.3

**Term Assumption:** Through September, 2011

**Compliance Method:** The actual average volume of CW flow during the second five years of the certification will be determined and reported. Any uncompensated losses at the end of the current license period will be mitigated at a ratio of two acres of wetland restoration for each acre of uncompensated area of production foregone (APF).

#### Calculation:

Step 1: Average the APF based on the actual circulating water flow volume over the first 5 years and the APF based on proposed CW flow profile over the remaining term.

$$\text{Avg. APF} = (41.8 \text{ acres} + 59.3 \text{ acres}) / 2 = 50.6 \text{ acres}$$

Step 2: Adjust for the term of the certification by dividing by two. Any extension of the license in 2011 would require the second half of the restoration payment.

$$50.6 \text{ acres} / 2 \times \$74,660/\text{acre} = \$1,888,898$$

Step 3: Calculate the net present value of the maintenance costs over the 10 year term of the existing license assuming a 12% discount rate.

$$\begin{aligned} \text{Annual Maintenance Cost} &= 50.6 \text{ acres} \times \$784/\text{acre-year} = \$39,670 \text{ per year} \\ \text{NPV}_{@12\%} \text{ of 10 years maintenance} &= \$224,147 \end{aligned}$$

Step 4: Calculate the total:

$$\begin{aligned} \text{Mitigation Fee} &= \$1,888,898 + \$224,147 = \$2,113,045 \\ \text{If extended in 2011:} & \$2,113,045 \end{aligned}$$

## HBGS Mitigation Proposal - Option 1b

**Operational Assumptions:** An average of the actual volume of circulating water (CW) flow over the first 5 years of the certification and a reasonable estimate of the shaped annual average volume of CW flow over the remaining term of the license.

### Profile of Actual Average Circulating Water Volume for the First 5 Years:

	1 <sup>st</sup> Qtr	2 <sup>nd</sup> Qtr	3 <sup>rd</sup> Qtr	4 <sup>th</sup> Qtr	Annual	APF (Acres)
% Operation	10%	24%	56%	20%	27.5%	
CW Volume (MGD)	25.4	60.8	142.0	50.7	69.7	41.8

### Profile of Proposed Average Circulating Water Volume for Remaining Term:

	1 <sup>st</sup> Qtr	2 <sup>nd</sup> Qtr	3 <sup>rd</sup> Qtr	4 <sup>th</sup> Qtr	Annual	APF (Acres)
% Operation	15%	35%	80%	25%	38.8%	
CW Volume (MGD)	38.0	88.7	202.8	63.4	98.2	59.3

**Term Assumption:** Through September, 2011

**Compliance Method:** The average CW flow volume will be calculated and reported on an annual basis. Any uncompensated impacts will be paid annually at a mitigation ratio of one acre of wetlands restoration for each acre of APF exceeded.

#### Calculation:

Step 1: Average the APF based on actual circulating water flow volume over the first 5 years and the APF based on proposed CW flow profile over the remaining term.

$$\text{Avg. APF} = (41.8 \text{ acres} + 59.3 \text{ acres}) / 2 = 50.6 \text{ acres}$$

Step 2: Adjust for the term of the certification by dividing by two. Any extension of the license in 2011 would require the second half of the restoration payment.

$$50.6 \text{ acres} / 2 \times \$74,660/\text{acre} = \$1,888,898$$

Step 3: Calculate the net present value of the maintenance costs over the 10 year term of the existing license assuming a 12% discount rate.

$$\begin{aligned} \text{Annual Maintenance Cost} &= 50.6 \text{ acres} \times \$784/\text{acre-year} = \$36,670 \text{ per year} \\ \text{NPV}_{@12\%} \text{ of 10 years maintenance} &= \$224,147 \end{aligned}$$

Step 4: Total the amounts:

$$\begin{aligned} \text{Mitigation Fee} &= \$1,888,898 + \$224,147 = \$2,113,045 \\ \text{If extended in 2011:} & \$2,113,045 \end{aligned}$$

## HBGS Mitigation Proposal - Option 2a

**Operational Assumption:** A reasonable estimate of the shaped annual average volume of circulating water (CW) flow over the remaining term of the license.

### Profile of Proposed Average Circulating Water Volume for Remaining Term:

	1 <sup>st</sup> Qtr	2 <sup>nd</sup> Qtr	3 <sup>rd</sup> Qtr	4 <sup>th</sup> Qtr	Annual	APF (Acres)
% Operation	15%	35%	80%	25%	38.8%	
CW Volume (MGD)	38.0	88.7	202.8	63.4	98.2	59.3

**Term Assumption:** Through September, 2011

**Compliance Method:** The actual average volume of CW flow during the second five years of the certification will be determined and reported. Any uncompensated losses at the end of the current license period will be mitigated at a ratio of two acres of wetland restoration for each acre of uncompensated area of production foregone (APF).

### Calculation:

Step 1: Determine the APF based on proposed CW flow profile over the remaining term.

$$\text{Avg. APF} = 59.3 \text{ acres}$$

Step 2: Adjust for the term of the certification by dividing by two. Any extension of the license in 2011 would require the second half of the restoration payment.

$$59.3 \text{ acres} / 2 \times \$74,660/\text{acre} = \$2,213,669$$

Step 3: Calculate the net present value of the maintenance costs over the 10 year term of the existing license assuming a 12% discount rate.

$$\begin{aligned} \text{Annual Maintenance Cost} &= 59.3 \text{ acres} \times \$784/\text{acre-year} = \$46,491 \text{ per year} \\ \text{NPV}_{@12\%} \text{ of 10 years maintenance} &= \$262,686 \end{aligned}$$

Step 4: Total the amounts.

$$\begin{aligned} \text{Mitigation Fee} &= \$2,213,669 + \$262,686 = \$2,476,355 \\ \text{If extended in 2011:} & \$2,476,355 \end{aligned}$$

## HBGS Mitigation Proposal - Option 2b

**Operational Assumption:** A reasonable estimate of the shaped annual average volume of circulating water (CW) flow over the remaining term of the license.

### Profile of Proposed Average Circulating Water Volume for Remaining Term:

	1 <sup>st</sup> Qtr	2 <sup>nd</sup> Qtr	3 <sup>rd</sup> Qtr	4 <sup>th</sup> Qtr	Annual	APF (Acres)
% Operation	15%	35%	80%	25%	38.8%	
CW Volume (MGD)	38.0	88.7	202.8	63.4	98.2	59.3

**Term Assumption:** Through September, 2011

**Compliance Method:** The average CW flow volume will be calculated and reported on an annual basis. Any uncompensated impacts will be paid annually at a mitigation ratio of one acre of wetlands restoration for each acre of APF exceeded.

#### Calculation:

Step 1: Determine the APF based on proposed CW flow profile over the remaining term.

$$\text{Avg. APF} = 59.3 \text{ acres}$$

Step 2: Adjust for the term of the certification by dividing by two. Any extension of the license in 2011 would require the second half of the restoration payment.

$$59.3 \text{ acres} / 2 \times \$74,660/\text{acre} = \$2,213,669$$

Step 3: Calculate the net present value of the maintenance costs over the 10 year term of the existing license assuming a 12% discount rate.

$$\begin{aligned} \text{Annual Maintenance Cost} &= 59.3 \text{ acres} \times \$784/\text{acre-year} = \$46,491 \text{ per year} \\ \text{NPV}_{@12\%} \text{ of 10 years maintenance} &= \$262,686 \end{aligned}$$

Step 4: Total the amounts.

$$\begin{aligned} \text{Mitigation Fee} &= \$2,213,669 + \$262,686 = \$2,476,355 \\ \text{If extended in 2011:} & \$2,476,355 \end{aligned}$$

## HBGS Mitigation Proposal - Option 3a

**Operational Assumptions:** An average of the actual volume of circulating water (CW) flow over the first 5 years of the certification and a reasonable estimate of the shaped annual average volume of CW flow assuming an unlimited license term.

### Profile of Actual Average Circulating Water Volume for the First 5 Years:

	1 <sup>st</sup> Qtr	2 <sup>nd</sup> Qtr	3 <sup>rd</sup> Qtr	4 <sup>th</sup> Qtr	Annual	APF (Acres)
% Operation	10%	24%	56%	20%	27.5%	
CW Volume (MGD)	25.4	60.8	142.0	50.7	69.7	41.8

### Profile of Proposed Average Circulating Water Volume for Remaining Term:

	1 <sup>st</sup> Qtr	2 <sup>nd</sup> Qtr	3 <sup>rd</sup> Qtr	4 <sup>th</sup> Qtr	Annual	APF (Acres)
% Operation	15%	35%	80%	25%	38.8%	
CW Volume (MGD)	38.0	88.7	202.8	63.4	98.2	59.3

**Term Assumption:** Unlimited

**Compliance Method:** The actual average volume of CW flow during the second five years of the certification will be determined and reported. Any uncompensated losses at the end of the current license period will be mitigated at a ratio of two acres of wetland restoration for each acre of uncompensated area of production foregone (APF).

### Calculation:

Step 1: Average the APF based on actual circulating water flow volume over the first 5 years and the APF based on proposed CW flow profile over the remaining term.

$$\text{Avg. APF} = (41.8 \text{ acres} + 59.3 \text{ acres}) / 2 = 50.6 \text{ acres}$$

Step 2: Calculate mitigation cost.

$$50.6 \text{ acres} \times \$74,660/\text{acre} = \$3,777,796$$

Step 3: Calculate the net present value of the maintenance costs over the 10 year term of the existing license assuming a 12% discount rate.

$$\begin{aligned} \text{Annual Maintenance Cost} &= 50.6 \text{ acres} \times \$784/\text{acre-year} = \$39,670 \text{ per year} \\ \text{NPV}_{@ 12\%} \text{ of 10 years maintenance} &= \$224,147 \end{aligned}$$

Step 4: Total the amounts.

$$\text{Mitigation Fee} = \$3,777,796 + \$224,147 = \$4,001,943$$

## HBGS Mitigation Proposal - Option 3b

**Operational Assumptions:** An average of the actual volume of circulating water (CW) flow over the first 5 years of the certification and a reasonable estimate of the shaped annual average volume of CW flow assuming an unlimited license term.

### Profile of Actual Average Circulating Water Volume for the First 5 Years:

	1 <sup>st</sup> Qtr	2 <sup>nd</sup> Qtr	3 <sup>rd</sup> Qtr	4 <sup>th</sup> Qtr	Annual	APF (Acres)
% Operation	10%	24%	56%	20%	27.5%	
CW Volume (MGD)	25.4	60.8	142.0	50.7	69.7	41.8

### Profile of Proposed Average Circulating Water Volume for Remaining Term:

	1 <sup>st</sup> Qtr	2 <sup>nd</sup> Qtr	3 <sup>rd</sup> Qtr	4 <sup>th</sup> Qtr	Annual	APF (Acres)
% Operation	15%	35%	80%	25%	38.8%	
CW Volume (MGD)	38.0	88.7	202.8	63.4	98.2	59.3

**Term Assumption:** Unlimited

**Compliance Method:** The average CW flow volume will be calculated and reported on an annual basis. Any uncompensated impacts will be paid annually at a mitigation ratio of one acre of wetlands restoration for each acre of APF exceeded.

#### Calculation:

Step 1: Average the APF based on actual circulating water flow volume over the first 5 years and the APF based on proposed CW flow profile over the remaining term.

$$\text{Avg. APF} = (41.8 \text{ acres} + 59.3 \text{ acres}) / 2 = 50.6 \text{ acres}$$

Step 2: Calculate mitigation cost.

$$50.6 \text{ acres} \times \$74,660/\text{acre} = \$3,777,796$$

Step 3: Calculate the net present value of the maintenance costs over the 10 year term of the existing license assuming a 12% discount rate.

$$\begin{aligned} \text{Annual Maintenance Cost} &= 50.6 \text{ acres} \times \$784/\text{acre-year} = \$39,670 \text{ per year} \\ \text{NPV}_{@12\%} \text{ of 10 years maintenance} &= \$224,147 \end{aligned}$$

Step 4: Total the amounts.

$$\text{Mitigation Fee:} = \$3,777,796 + \$224,147 = \$4,001,943$$

## HBGS Mitigation Proposal - Option 4a

**Operational Assumption:** A reasonable estimate of the shaped annual average volume of CW flow assuming an unlimited license term.

### Profile of Proposed Average Circulating Water Volume for Remaining Term:

	1 <sup>st</sup> Qtr	2 <sup>nd</sup> Qtr	3 <sup>rd</sup> Qtr	4 <sup>th</sup> Qtr	Annual	APF (Acres)
% Operation	15%	35%	80%	25%	38.8%	
CW Volume (MGD)	38.0	88.7	202.8	63.4	98.2	59.3

**Term Assumption:** Unlimited

**Compliance Method:** The actual average volume of CW flow during the second five years of the certification will be determined and reported. Any uncompensated losses at the end of the current license period will be mitigated at a ratio of two acres of wetland restoration for each acre of uncompensated area of production foregone (APF).

#### Calculation:

Step 1: Determine the APF based on proposed CW flow profile over the remaining term.

$$\text{Avg. APF} = 59.3 \text{ acres}$$

Step 2: Calculate mitigation cost.

$$59.3 \text{ acres} \times \$74,660/\text{acre} = \$4,427,338$$

Step 3: Calculate the net present value of the maintenance costs over the 10 year term of the existing license assuming a 12% discount rate.

$$\begin{aligned} \text{Annual Maintenance Cost} &= 59.3 \text{ acres} \times \$784/\text{acre-year} = \$46,491 \text{ per year} \\ \text{NPV}_{@12\%} \text{ of 10 years maintenance} &= \$262,686 \end{aligned}$$

Step 4: Total the amounts.

$$\text{Mitigation Fee} = \$4,427,338 + \$262,686 = \$4,690,024$$

## HBGS Mitigation Proposal - Option 4b

**Operational Assumption:** A reasonable estimate of the shaped annual average volume of Circulating water flow assuming an unlimited license term.

### Profile of Proposed Average Circulating Water Volume for Remaining Term:

	1 <sup>st</sup> Qtr	2 <sup>nd</sup> Qtr	3 <sup>rd</sup> Qtr	4 <sup>th</sup> Qtr	Annual	APF (Acres)
% Operation	15%	35%	80%	25%	38.8%	
CW Volume (MGD)	38.0	88.7	202.8	63.4	98.2	59.3

**Term:** Unlimited

**Compliance Method:** The average CW flow volume will be calculated and reported on an annual basis. Any uncompensated impacts will be paid annually at a mitigation ratio of one acre of wetlands restoration for each acre of APF exceeded.

#### Calculation:

Step 1: Determine the APF based on proposed CW flow profile over the remaining term.

$$\text{Avg. APF} = 59.3 \text{ acres}$$

Step 2: Calculate mitigation cost.

$$59.3 \text{ acres} \times \$74,660/\text{acre} = \$4,427,338$$

Step 3: Calculate the net present value of the maintenance costs over the 10 year term of the existing license assuming a 12% discount rate.

$$\begin{aligned} \text{Annual Maintenance Cost} &= 59.3 \text{ acres} \times \$784/\text{acre-year} = \$46,491 \text{ per acre} \\ \text{NPV @ 12\% of 10 years maintenance} &= \$262,686 \end{aligned}$$

Step 4: Total the amounts.

$$\text{Mitigation Fee} = \$4,427,338 + \$262,686 = \$4,690,024$$

## HBGS Mitigation Proposal - Option 5

**Operational Assumption:** The maximum permitted circulating water flow over the term of the existing license.

### Profile of Maximum Circulating Water Volume:

% Operation	1 <sup>st</sup> Qtr	2 <sup>nd</sup> Qtr	3 <sup>rd</sup> Qtr	4 <sup>th</sup> Qtr	Annual	APF (Acres)
	100%	100%	100%	100%	100%	
CW Volume (MGD)	253.5	253.5	253.5	253.5	253.5	104

**Term:** Through September, 2011

**Compliance Method:** Not Applicable

### Calculation:

Step 1: Determine the APF based on maximum permitted CW flow.

$$\text{Avg. APF} = 104 \text{ acres}$$

Step 2: Adjust for the term of the certification by dividing by two. Any extension of the license in 2011 would require the second half of the restoration payment.

$$104 \text{ acres} / 2 \times \$74,660/\text{acre} = \$3,882,320$$

Step 3: Calculate the net present value of the maintenance costs over the 10 year term of the existing license assuming a 12% discount rate.

$$\begin{aligned} \text{Annual Maintenance Cost} &= 104 \text{ acres} \times \$784/\text{acre-year} = \$81,536 \text{ per year} \\ \text{NPV}_{@12\%} \text{ of 10 years maintenance} &= \$460,697 \end{aligned}$$

Step 4: Total the amounts.

$$\begin{aligned} \text{Mitigation Fee} &= \$3,882,320 + \$460,697 = \$4,343,017 \\ \text{If extended in 2011:} & \$4,343,017 \end{aligned}$$

# Huntington Beach Generating Station Empirical Transport Model Estimates for Area of Production Foregone Using Seasonal Flow Reduction

August 14, 2006

*Prepared for:*

**Mr. Paul Hurt**  
AES Southland  
Huntington Beach, CA

*Prepared by:*

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141 Suburban Rd., Suite A2  
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## Introduction

This report presents estimates of area of production foregone (APF) for entrainment effects of the HBGS using two different seasonal flow reductions. A previous report dated July 5, 2006 presented APF values calculated using a different set of flow reductions. The estimates presented in this report for nearshore taxa are compared with estimates calculated using a daily flow of 507,000,000 mgd that were presented in the HBGS Entrainment and Impingement Study Final Report (IM&E Report) (MBC and Tenera 2005). The APF estimates for gobies are based on the wetland areas presented in a previous report.

## Methods and Results

The average APF for nearshore sandy habitat was recalculated using only the taxa that primarily occur in the nearshore areas around HBGS as adults. The APF values in the previous report were calculated from the original  $P_M$  estimates and extrapolated source water areas. Separate  $P_M$  estimates were calculated by adjusting the intake volume of 253,500,000 mgd (959,602 m<sup>3</sup>) using the following two different flow reduction scenarios:

Scenario	Quarter 1 % of Maximum	Quarter 2 % of Maximum	Quarter 3 % of Maximum	Quarter 4 % of Maximum
1	10	24	56	20
2	15	35	80	25

The entrainment estimates from the surveys in each of the periods were calculated using the adjusted flows and  $P_M$  estimated using the adjusted  $PE$  estimates based on the reduced flows. The APF calculation using the revised  $P_M$  estimates are presented in Table 1.



The calculation of APF for CIQ gobies involved recalculating the  $P_M$  estimate by including an estimate of the larval gobies in the estuarine habitats in the vicinity of the HBGS. The revised *ETM* estimate for CIQ gobies was calculated using *PE* estimates that incorporates both nearshore and estuarine area larvae. The estimate of APF for CIQ gobies was based on the adult habitat in the estuarine areas around the HBGS. The revised values are presented in Table 1.



## HBGS APF Calculations

Table 1. APF values calculated from *ETM* model estimates based on three different flow reductions from 253,500,000 mgd. The *ETM* estimate from the 2005 316(b) Demonstration Report were calculated using an intake volume of 507,000,000 mgd.

Taxa	P <sub>M</sub> Alongshore from Report	P <sub>M</sub> Flow (10,24,56,20)	P <sub>M</sub> Flow (15,35,80,25)	Alongshore Displacement (km)	Area Width (km)	APF Report Estimates (acres [km <sup>2</sup> ])	APF Flow (10,24,56,20) (acres [km <sup>2</sup> ])	APF Flow (15,35,80,25) (acres [km <sup>2</sup> ])
Estuarine Taxon - source water includes estuarine areas								
unid. gobies	0.0090	0.0017	0.0024		Area (acres [km <sup>2</sup> ]) = 3397.78 (1375.04)	30.68 (0.12)	5.74 (0.02)	8.19 (0.03)
Coastal Taxa								
spotfin croaker	0.0029	0.0005	0.0007	16.9418	4.45	54.77 (0.22)	9.31 (0.04)	13.41 (0.05)
queenfish	0.0063	0.0018	0.0025	84.8827	4.45	584.3 (2.36)	164.28 (0.66)	234.28 (0.95)
white croaker	0.0071	0.0008	0.0011	47.8364	4.45	374. (1.51)	42.08 (0.17)	59.97 (0.24)
black croaker	0.0012	0.0003	0.0005	19.4240	4.45	25.42 (0.1)	7.05 (0.03)	10.04 (0.04)
blennies	0.0077	0.0010	0.0013	12.8190	4.45	108.26 (0.44)	13.53 (0.05)	17.76 (0.07)
diamond turbot	0.0058	0.0006	0.0007	16.9325	4.45	107.62 (0.44)	10.24 (0.04)	13.03 (0.05)
California halibut	0.0025	0.0004	0.0005	30.9100	4.45	84.97 (0.34)	12.24 (0.05)	16.99 (0.07)
Cancer megalops	0.0107	0.0026	0.0037	26.5015	4.45	311.81 (1.26)	76.06 (0.31)	108.99 (0.44)
Average for Coastal Taxa					Average =	206.39 (0.84)	41.85 (0.17)	59.31 (0.24)

